

General Dynamics Corporation Shipyard
97 East Howard St. at Fore River
Quincy
Norfolk County
Massachusetts

HAER No. MA-26

HAER
MASS.
11-QUI,
10-

PHOTOGRAPHS

HISTORICAL & DESCRIPTIVE DATA

Historic American Engineering Record
National Park Service
Department of the Interior
Washington, D. C. 20240

HISTORIC AMERICAN ENGINEERING RECORD

General Dynamics Corporation Shipyard

HAER
MASS,
11-041,
10-

MA-26

Location: 97 East Howard Street at Fore River
Quincy, Norfolk County, Massachusetts

UTM: 337000.467800
Quad: Weymouth

Date of Construction: 1899+

Original Use: Shipbuilding

Present Use: Shipbuilding and repair

Current Owner: General Dynamics Corporation

Significance: The Fore River Engine Company was organized in 1884 by Thomas A. Watson (1854-1934) and Frank O. Wellington (1858-1944). After his work with Alexander Bell in perfecting the telephone, Watson established a small machine shop in East Braintree on the Fore River in order to develop a rotary marine engine invented by L. J. Wing of Lexington. In connection with this work, Watson hire Frank O. Wellington, formerly a machinist employed at the Atlantic Works in East Boston. Though Wing's engine was not a commercial success, the pair recognized the market for marine engines and organized the Fore River Engine Company. For over a decade, the firm produced successful marine engines for yachts and other types of vessels. In 1896, it undertook the construction of the first hulls as well as engines, and within two years, was making steel-hulled vessels of up to 4,000 tons displacement.

In 1899, a Navy contract for the cruiser, U.S.S. Des Moines, forced the yard to move from East Braintree two miles down river to the present site on Quincy Neck. Reorganized as the Fore River Ship and Engine Company in 1901, the company entered into ship repair as well as shipbuilding. In an unusual departure for shipyards, the firm erected its own electric

General Dynamics Corporation
Shipyard
HAER No. MA-26
(Page 2)

electric generating plant. Its forge was said to be the third largest in the U. S., and the only one attached to a shipyard of sufficient dimensions to turn out the heaviest work in shipbuilding.

In 1913, the yard was acquired by the Bethlehem Steel Corporation, which operated the plant for exactly fifty years. During both world wars, the yard was one of the largest builders of naval vessels in the country. Under Navy contracts in 1943, the yard reached its peak employment with 32,000 men employed. Between and after the wars, the firm built important merchant vessels and tankers. In December 1963, the shipyard property was sold to the General Dynamics Corporation. An important part of the yard's business has been the construction of Liquified Natural Gas (LNG) tankers, the first of which was launched in 1975.

The yard's facilities today include five building basins, one wet basin, four outfitting piers, and a floating drydock. There are 24 cranes serving these basins with capacities ranging from 20 to 150 tons. The Goliath gantry crane, which spans basins #6 and #7, has a capacity of 1,200 tons and is the largest crane in the western hemisphere. There are 40 buildings within the shipyard, ranging from manufacturing shops and warehouses to administrative offices. Among the oldest structures is fabrication ship #1, a two-story brick and steel-frame structure built in 1916. When built, the largest tool ship in the world, its original dimensions, since enlarged, were 225x750 feet. Other important expansion and modernization programs took place during World War II and in the late 1950s. Today, the yard covers 187 acres and employs an average 5,000 workers.

References:

"A New England Ship Building Industry," Marine Review 2 November 1899, pp. 12-14; Wilson, pp. 268-270; Edwards, pp. 220-241; Stone, pp. 1069-1076; "Electrical Equipment of a Modern Ship Yard," Electrical Review 40 (26 April 1902), pp. 527-532; Quincy Patriot Ledger, numerous articles (indexed, Thomas Crane Public Library, Quincy)

General Dynamics Corporation
Shipyard
HAER No. MA-26
(Page 3)

Transmitted by: Jean P. Yearby, 1984, from data compiled by
Peter Stott

ADDENDUM TO
GENERAL DYNAMICS CORPORATION SHIPYARD
(Quincy Shipyard)
97 East Howard St. at Fore River
Quincy
Norfolk County
Massachusetts

HAER No. MA-26

HAER
MASS
11-QU,
10-

PHOTOGRAPHS

WRITTEN HISTORICAL AND DESCRIPTIVE DATA

HISTORIC AMERICAN ENGINEERING RECORD
National Park Service
Department of the Interior
1849 C Street NW
Washington, DC 20240

HAER
MASS
11-QUI,
10-

HISTORIC AMERICAN ENGINEERING RECORD

Addendum to

GENERAL DYNAMICS CORPORATION SHIPYARD

HAER No. MA-26

(Page ~~3~~
4)

Two pages of documentation were already submitted to the Library of Congress.

Location: 97 East Howard Street at Fore River, Quincy/Braintree, MA. Bounded by East Howard Street (west), Quincy Avenue (south), Weymouth Fore River (east), South Street, Washington Street, and Fore River Bridge (north). Property lies in the cities of Quincy and Braintree, Norfolk County, Massachusetts.

USGS Weymouth, MA Quadrangle, Universal Transverse Mercator
Coordinates: A. 19.337310.2677690
B. 19.337000.2677680
C. 19.336620.4677660
D. 19.336750.4678230
E. 19.337540.4678600

Date of Construction: 1900-1984

Present Owner: Massachusetts Water Resources Authority
Charlestown Navy Yard
100 First Avenue
Boston, Massachusetts 02129

Present Use: Vacant

Significance: Throughout its more than eighty year history, the General Dynamics Corporation/Quincy-Fore River Shipyard was one of the leading private shipyards in the United States. Producing both military and merchant vessels, it built more ships than any other U.S. yard in World War I; was among the five largest producers in World War II; and produced some of the largest and most innovative ships launched in the U.S. for the merchant marine in the difficult post-war period. It set records for production speed in both wars, and built the first true aircraft carrier, the first nuclear powered surface ship, and some of the largest commercial vessels ever built. The shipyard pioneered the technique of pre-outfitting or modular construction of ships.

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 4)

5

From the original construction in 1901-1902 of the largest forge in the U.S. to the installation in 1974 of the giant 1200 ton Goliath gantry crane, still the largest crane in the western hemisphere, the shipyard's facilities were at or near the state of the art in ship building in the U.S. A number of the facilities from each period are still extant on the site, providing examples of important technological changes in shipbuilding.

Project Information:

This documentation was undertaken in June/July 1989 by the Massachusetts Water Resources Authority (MWRA) in accordance with a Memorandum of Agreement. Portions of the Shipyard will serve as a staging area and shipping point during construction of sewage treatment facilities on Deer Island in Boston Harbor and for other water supply and waste-treatment related activities.

Preparer:

Virginia A. Fitch
The Public Archaeology Laboratory, Inc.
387 Lonsdale Avenue
Pawtucket, RI 02860
(401) 728-8780

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 5)

[Note: Text extracted and adapted from Boston Affiliates, Inc., Quincy-Fore River Shipyard Historic Resources Survey and Addendum (Prepared for Massachusetts Water Resources Authority, October 20, 1988 and January 2, 1989).]

SITE DESCRIPTION AND OPERATIONS OVERVIEW

The former General Dynamics shipyard, historically known as the Quincy-Fore River shipyard, is located on the Weymouth Fore River in the cities of Quincy and Braintree, Massachusetts, southeast of Quincy center. The 183 acre site is bounded by Washington Street and the Fore River Bridge on the north, East Howard Street on the west, Quincy Avenue on the south, and the Weymouth Fore River on the east. The mailing address for the site is 97 East Howard Street, Quincy, Massachusetts.

The facility consists of a 162 acre main facility located on the Braintree-Quincy town line, four satellite lots totalling 8.5 acres located in Quincy and eight satellite parcels containing 9.5 acres in Braintree (Leggat & McCall, Appraisal Report: General Dynamics Shipyard, p. 9). There are six shipbuilding basins, five of which are dry docks and one a wet basin, ranging in length from 812 to 940 feet and in width from 120 to 150 feet (Leggat & McCall, p. 13). In area, the six basins cover approximately 120,000 square feet or 16.6 acres. There are four outfitting piers in the northeast portion of the site, ranging in length from 560 feet to 880 feet and in width from 23 feet to more than 42 feet, totalling approximately 114,000 square feet (Leggat & McCall, p. 11). A floating drydock is located to the south of the dry basins.

The shipyard property has a frontage on the Weymouth Fore River of approximately 3,700 feet. The 162 acre main yard site consists of approximately 84 acres of upland, 34 acres of filled land, 15 acres of land for dry docks and basins, and approximately 29 acres of water. The ship channel in the river is dredged to a depth of 35 feet to the sea.

The yard is organized along traditional lines for a shipyard of its size. Management, design, and engineering offices are located near the yard's entrance, away from valuable shore frontage. Plate storage areas are located on the inland portion of the site as well, for the storage of the large steel plates used in ship construction. Ship designs are translated from plans into exact pattern forms in the yard's spacious mold lofts, "where the lines of the hull, the shapes of the frames and other parts of the hull, are drawn out full size" (Watson, p. 218). In the pattern shops, wood patterns are fashioned as models for the fabrication of the actual ship components. Within the massive fabrication shops, flat steel plates, support beams, and other pieces of the vessel are shaped, rolled, bent, punched and cut according to design. Some of these pieces are then pre-assembled on platens, fields of adjustable supports where angled and curved hull plates are connected. This was originally accomplished by rivets and now by welding.

In the building basins, or drydocks, the keel is laid, and construction of the hull is begun. The massive steel framework structure surrounding these basins is equipped with cranes to supply ship

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 6)

7

components. Engines are built in the machine shops; superstructure and compartments in the sheet metal shops. Once the hull and superstructure(s) are fairly complete, the vessel is launched and placed in the outfitting pier. The outfitting pier is equipped with various cranes, so that the remainder of the construction can be completed, including the ship's internal systems and deck gear. Interior details and decking are manufactured in the woodworking shop, and many other important minor departments such as annealing furnaces, galvanizing tanks, piping shops, and shot blast and paint facilities also contribute to the fitting-out process (Watson, p. 219).

There are 24 cranes serving these basins with capacities ranging from 20 to 150 tons. The Goliath gantry crane, which spans basins #6 and #7, has a capacity of 1200 tons and is the largest crane in the western hemisphere. It is a major Quincy landmark.

There are 78 industrial type buildings within the shipyard, containing approximately 1,945,000 square feet, ranging from manufacturing shops and ware houses to administrative offices, to steel sheds. They were built between the early 1900s and the late 1970s and are generally in fair to average condition for their age, but there is physical and functional obsolescence of many of the buildings. In height, the buildings vary from 9 feet to 70 feet, and in size anywhere from 1,000 square feet to 300,000 square feet.

The land on which the Quincy Shipyard is situated has been greatly modified since the beginning of this century. Prior to the year 1900, the central portion of the property existed as "Quincy Point," a peninsula of dry land that extended from west to east into the Weymouth Fore River. At that time, Quincy Point was a privately-owned residential area accessed by Howard Avenue, which extended from roughly the area of the present on-site hospital (Building #71), to the east end of the Weld Assembly Building (Building #3) to the west. Quincy Point was separated from the surrounding land by two tidal creeks to the north and south. These creeks, Bent's Creek to the north and Hayward's Creek to the south, discharged to the Weymouth Fore River near what is now the area between Piers 1 and 2 and the No. 12 Basin. Both creeks are now filled in.

At the present time, land use to the north and west of the site is primarily residential, but also includes large parking areas, gasoline stations, automotive service facilities, and restaurants. To the north, across Washington Street, is the large manufacturing plant of Proctor & Gamble. To the south, land use is dominated by a petroleum product tank farm and hazardous waste treatment and storage facilities. An automotive salvage yard, a tree pruning service, a rivet company, and private residences are also located on the rocky highland immediately adjacent to the site's southern boundary.

HISTORICAL DEVELOPMENT AND ACHIEVEMENTS

INTRODUCTION

The Fore River Engine Company was founded in 1884 and moved to the Quincy-Fore River site in 1901. From that time onward, until its closing in 1986, the Quincy-Fore River yard's history exemplifies three major aspects of the twentieth century shipbuilding industry: 1) the need to keep pace with rapidly changing technologies; 2) the need to balance military contracts with merchant marine production in the boom-and-bust cycles created by war and peace; and 3) the financial difficulties inherent in operating facilities where large amounts of capital are tied up in the production of each ship. These factors resulted in periodic changes of ownership, each time involving acquisition by a larger entity. Fore River Engine Company changed from a partnership to a corporation in 1901, and sold stock in 1902; in 1913 it sold out to Bethlehem Shipbuilding Company, which had far larger capital resources. Bethlehem, in turn, sold out to General Dynamics, one of the nation's largest defense contractors, in 1964.

The yard's history encompasses three periods: 1) the years leading up to and including World War I; 2) the 1920s through World War II; and 3) the post-war years from 1946 to 1986. In the first period, the Fore River Engine Company grew from a small producer of marine engines to a large shipyard producing all kinds of naval ships, benefitting from the U.S. naval buildup promoted by Alfred Thayer Mahan and Theodore Roosevelt. After a significant infusion of capital by Bethlehem, it became the largest supplier of Navy ships for World War I.

In the second period, Bethlehem's major up-grading of facilities in the 1920s laid the foundations for Quincy's impressive production in World War II. Vessels produced ranged from landing craft, to destroyers and destroyer escorts, to the majority of U.S. Navy cruisers, to battleships and aircraft carriers. They included such famous ships as the *Massachusetts* and the *Wasp*.

In the third period, Bethlehem and General Dynamics used the yard's traditional flexibility and continued to update its technologies to respond to new market demands, pioneering in the design and production of nuclear-powered guided missile cruisers, frigates and submarines, and of ever larger tankers, including ten Liquefied Natural Gas (LNG) tankers.

PREWAR AND WORLD WAR I PERIODS

Pre 1901

Shipbuilding has been carried on in Quincy since 1696 when the fishing ketch *Unity* was launched from Ship's Cove, the area now known as Quincy Neck. In the latter half of the eighteenth century, Quincy was internationally known as a shipbuilding center. Vessels such as the 116-foot *Massachusetts* were launched in 1789, and carried on commerce with European and Chinese ports (Quincy School Board, *Quincy Historical Booklets*, p. 42-43).

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HIAER No. MA-26 (Page 8)

7

Shipbuilding at Quincy Point, later home of the Fore River Engine Company, started in 1815. A Mr. John Souther founded Souther's wharf, a large shipbuilding establishment. Many famous and swift clipper ships called Quincy their birthplace. The most famous shipbuilder at Quincy Point was a Mr. Thomas of Rockland, Maine, who built 19 large ships, one brig and six schooners between 1854 and 1878 (Helen M. Lincoln, *Recollection of Quincy Point and Shipbuilding*, pp. 4-5). However, by 1850, steam power began to tell over sail, and shipbuilding ceased on Quincy Point for a time.

In 1884, Thomas A. Watson, former assistant to telephone inventor Alexander Graham Bell, founded the Fore River Engine Company. Located on the shore of the Weymouth Fore River in East Braintree, the firm began producing successful marine steam engines for yachts and other types of vessels. In 1896, Fore River won a Navy contract to construct two 400-ton boat destroyers, the *Lawrence* and *Macdonough*, with a bid of \$562,000. Several years later, a larger site was required for construction of a newly contracted ship, the *Des Moines*, and the company relocated to Quincy Point.

1901-1913

In 1901, Quincy Point consisted of a point of sparsely-populated, residential land extending into the Fore River with a creek on either side: Bent's Creek to the north and Hayward's Creek to the south. The former became the yard's early wet basin, and both were eventually filled in. The original width of the Weymouth Fore River at Quincy Point was 200 feet and the depth at low tide was 25 feet (*Atlas*, 1897).

This original shipbuilding operation occupied a total of 78 acres along the 1.75 mile shoreline of Quincy Point. Between 1901 and 1905 the Shipyard consisted of machine and tool shops, warehouses, a forge, a carpentry and rigging shop, and a separate shop for yard construction. Other buildings were a storehouse, ship tool shop, patterns storage shop, joiner, pattern and mold loft, a power house and boiler room, and cranes. All were of wood except for the power and boiler houses which were of brick (Sarcone and Rines, p. 7). The Fore River Engine Company's original four-story office building was floated over from East Braintree.

Early development on the site was oriented to Bent's Creek, which, by 1907, had a bulkhead along its southern edge. This bulkhead was the forerunner of Outfitting Pier No. 2 (Structure 2S). A number of building slips entered the Fore River between the two creeks.

By 1905 when the yard was officially started, there was a total of 11 acres under cover. Light and power cables were run underground in tunnels build of Quincy granite. The yard had some of the largest shipbuilding equipment of its day. Two 100 ton hammers were used to shape materials, while specially built 75 ton and 25 ton cranes were used to drop materials into place. The forge was the largest in the United States at the time, and did all sorts of tasks, including miscellaneous jobs for other shipyards in the area. The forge was so busy that it operated on a 24 hour a day, 6 day a week schedule. The yard also had its own railroad.

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 9)

10

Existing buildings of which at least portions date from this period include the Angle Layout Shop (Building 5), the No. 2 Warehouse, the Blacksmith Shop (Building 32), and the Electrical Shop (Building 33) (Herbert S. Houston, "Growth of a Great Shipyard," *World's Work*, p. 40-41). By the end of its first ten years at the Quincy yard, Fore River shipyard had produced over 75 vessels, including battleships, destroyers, cruisers, steamers, submarines, and private vessels, of all sizes and descriptions. Major military contracts included U.S. Government orders for two 14,500 ton battleships, the *Rhode Island* and the *New Jersey* (441 feet long, top speed 17 knots), delivered 1906, battleship *Vermont* (426 feet long, top speed 17 knots); the 22,000 ton *North Dakota* of the *Delaware* class (418 feet long, top speed 22 knots); as well as tugboats, scout cruisers, lightships, and torpedo boat destroyers. The last contract won by the Fore River Ship and Engine Company management was for the famous U.S. Navy battleship *Nevada*.

In addition, the shipyard delivered five submarines to the Japanese Navy and the battleship *Rivadavia* (launched 1914) to the Argentinian Navy. Civilian contracts included the world's only seven-masted schooner, *Thomas W. Lawson* (403 feet long); freight steamer *Boston*; and a passenger steamer *Providence* of the Fall River Line, among other types of vessels.

The building of the *Rivadavia*, while testifying to the shipyard's success, also highlighted serious shortcomings in the business of shipbuilding. It placed a huge strain on available resources of capital and manpower. In response, Admiral Bowles, President of the Fore River Ship and Engine Company recommended that the yard be sold to a corporation with greater capital resources.

Bethlehem Shipbuilding

In 1913, the Quincy shipyard was purchased by the Bethlehem Steel Company for \$4,800,000. Bethlehem Steel's owner, Charles Schwab, envisioned an empire capable of "turning out all iron and steel products used on land and sea." At the time of the sale, the shipyard was doing an annual business of between 6 and 12 million dollars. Under construction in the yard at that time were 23 vessels worth about \$20 million. The yard was about 110 acres in area and could turn out about 60,000 tons of shipping annually (General Dynamics, p. 6).

It was in large part Schwab's vision and genius that made Quincy into the great facility that it became during World War I and World War II. Almost immediately after the purchase of the yard, Bethlehem began to make capital improvements.

Besides material investments, Bethlehem also added a company Service Department that took responsibility for many human services at the yard. The Service Department staffed the shipyard hospital, organized a band, a glee club, ball teams, and social events, as well as publishing the monthly *Fore River Log* (Sarcone and Rines, pp. 17-18).

Before American entry into the war, the yard contracted to build ten submarines for the Royal Navy of Great Britain in 1914, but American neutrality in World War I prohibited construction of warships for belligerents. Bethlehem instead had Fore River prefabricate the submarines, then ship

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 10)

11

the parts to Canada, where Quincy labor assembled the submarines, all in the space of about ten months.

World War I

At the time of World War I, Bethlehem Steel owned seven shipyards in the United States. These were located at Sparrow's Point and Baltimore, Maryland; Wilmington, Delaware; Elizabeth, New Jersey; Boston and Quincy, Massachusetts; and two West Coast yards at Los Angeles and San Francisco. The only plants comparable to Quincy in scale and capability were Sparrow's Point and the Union Yard in San Francisco (*The Properties of Bethlehem Steel Corporation*, pp. 67-71).

The U.S. entry into World War I had a huge effect on the Quincy shipyard. Knowing that wartime contracts were imminent, the yard began massive capital improvements. Fabrication Ship 1 was built in 1916. A large steel construction framework was built around the southern basins in 1917 (General Dynamics, p. 5). The first major enlargement of the Shipyard by the Bethlehem Shipbuilding Company came during 1919, when a steel mill was constructed, measuring 770 feet long and about 188 feet wide. The top floor contained a sheet metal shop and the new mold loft. On the ground was one of the world's largest plate and angle shops. The building had 75 machines served by eight cranes, and the shop could fabricate 250 tons of steel a day.. Another major improvement was a new concrete and steel shipbuilding slip 1,000 feet long. The slip had three 7 1/2 ton cranes 144 feet above the slip and one 50 ton crane 122 feet above the slip.

During the war, the Navy placed an initial order for a total of 28 destroyers, 15 submarines, and one battlecruiser. In order to fill the large number of destroyer contracts, Bethlehem constructed a new shipyard devoted solely to destroyer construction. The yard was located to the north of the main Quincy-Fore River yard, in another part of Quincy and became known as the Squantum yard. It was started in 1917 and deactivated in 1919, after turning out 35 destroyers.

During the World War I period, Quincy and Squantum delivered a total of 71 destroyers, more than all other U.S. shipyards combined. At the main Quincy-Fore River yard, 35 destroyers were produced, including the record-setting construction of the destroyer *Mahan*, built in only 174 days during 1917. Later in the war, the Squantum yard bettered that record, completing the destroyer *Reid* in 45 and 1/2 days, a record for that time (Quincy School Department, p. 46). This remarkable shortening of construction time illustrates the pace at which the Quincy-Bethlehem yards operated during the war. These World War I achievements established Fore River as one of the foremost American shipyards.

In 1918, Quincy won a ten thousand dollar bet with the Union Shipyard in San Francisco on which yard could build the most destroyers that year. Quincy won, building 18 destroyers to Union's 6, plus 10 submarines, and 6 merchant ships (*A Century of Pride*, p. 5).

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page ~~11~~)

12

Post World War I

Surprisingly, Fore River did not suffer an immediate depression after the war as was typical in the American shipbuilding industry. There were several wartime contracts to finish out, including three merchant vessels for the Emergency Fleet Corporation. There was also a contract for two Navy scout cruisers, the *Raleigh* and *Detroit*. There were two new naval contracts in 1920, but after this, no new work came into the yard until 1925.

In 1921, as a result of the Washington Naval Conference, the keel of the *U.S.S. Lexington* was laid, not as a battleship as originally planned, but as an aircraft carrier. She was launched in 1925, and delivered in 1928. She was the largest warship Quincy had built to date, with a length of 888 feet, and a beam of 105 feet. The *Lexington* was one of the most famous ships ever built by Quincy. She was the first true aircraft carrier in U.S. Navy service, and served with distinction as one of the main American carriers in the Pacific until sunk in the battle of the Coral Sea in May of 1942.

It was during this lull that Bethlehem took the opportunity to do some expansion work at Quincy. One vitally important addition was a 10,000 ton floating drydock moved to the yard from East Boston in 1924. Another addition that increased the yard's capacity was the construction of a new battleship slip that could hold vessels of a size never before built in Quincy.

By 1923, most of Hayward's Creek had been filled and was flowing through a culvert that discharged into the Weymouth Fore River near the westerly end of what is presently the #12 basin. The filling of Bent's creek began sometime after 1923 and was generally completed by 1939, when it was filled to a point near the western end of basin #2.

With a lack of post-war contracts, the yard did a great volume of repair work in the mid-1920s, from naval vessels to floating hotels, and even railroad locomotives. The management of Quincy shipyard hoped to keep the skilled, specialized workers employed, as their collective skills were as valuable to the yard as any machinery. This strategy proved a success when the Navy ordered two new cruisers and five new cutters.

The 1930s saw a downturn in the productivity of the yard in the Great Depression. The effect of the Depression on Fore River can be seen in the employment figures at the yard during that period. In 1931 there were 4,900 workers at the yard, and by 1933, as unemployment was peaking nationally, the yard was employing only 812 workers, with work at a virtual standstill.

The yard's recovery came with the Naval Expansion Program of 1938. At this time, Bethlehem changed the yard's name to the Bethlehem Steel Company, Shipbuilding Division. By 1941 employment at the yard was up to 17,000 (Sarcone and Rines, p. 22). The major work undertaken at this time was on U.S. Navy contracts for two more cruisers, nine destroyers, and the carrier *Wasp*.

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 12)

13

World War II

The coming of World War II had a huge effect on the Quincy yard. As a modern shipyard with massive production potential, it was in a position to excel at war-related shipbuilding. Quincy had a long-standing tradition of warship construction, and the U.S. Navy looked to Quincy to provide a large part of the wartime fleet. Peak employment at the Fore River yard was reached in 1943 when some 32,000 (including 1,200 women) were occupied on three full-strength shifts. Payroll in this peak year was \$110 million annually, and ship contracts for that period amounted to some \$700 million (Sarcone and Rines, p. 27).

The main Fore River shipyard in Quincy built 92 naval vessels of 11 different types in the period from 1941 to 1945, the most notable being a battleship, carriers, heavy and light cruisers, and destroyers, for which the yard was widely known. The major reason that Quincy could be so productive was the substantial physical plant built by Bethlehem Shipbuilding Division.

To measure the historic significance of the vessels produced at the Quincy-Fore river shipyard in World War II is a difficult task. The majority of the U.S. Navy cruisers were built at Quincy, as were many fleet destroyers and destroyer escorts, which did valuable convoy duty in both theaters.

Some of the better known vessels were the battleship *Massachusetts*, the *Essex* class carriers *Lexington (II)*, *Bunker Hill*, *Wasp*, *Hancock*, and *Philippine Sea*. There were numerous cruisers produced, including the heavy cruisers *Baltimore*, *Boston*, *Canberra*, *Quincy*, *Pittsburgh*, *St. Paul*, *Columbus*, *Helena*, *Oregon City*, *Albany*, and *Rochester*. There were six light cruisers, two anti-aircraft cruisers and nineteen destroyers of various classes.

For excellence in production performance, Quincy shipyard received the coveted Navy E, with four additional stars. One destroyer escort was built in just 23 working days from keel laying to launching. At one point, five LST's were delivered in a span of only 50 hours (*A Century of Pride*, p. 6).

During the war, a \$25 million expansion was undertaken at the Quincy-Fore River shipyard to facilitate work on large numbers of naval vessels, and to modernize existing facilities at the yard for both construction and repair.

A new fabrication shop was constructed, with two bays, Bay #1 measuring 766 x 188 feet, and Bay #2 measuring 1,014 x 102 feet. Inside were 17 bridge cranes, 6 foot angle furnaces, 36 foot plate furnaces, 36 foot planers, and a 1500 ton hydraulic press. There was a plate storage area with an 18,000 ton capacity, served by 6 revolving cranes, and a covered welding platen area totalling 74,000 feet. It was one of the few shops in the country capable of designing and constructing gun turrets.

A new machine shop was also built, measuring 892 by 120 feet (138,000 square feet) with eight bridge cranes; nine boring mills; nine lathes larger than 48", the largest being 108'; and ten planes above 36" and gear and turbine cutting machines. The new mold loft was the largest in the United States at the time, encompassing 142,000 square feet. A new brass foundry could produce 100,000

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page ~~13~~)

14

pounds per week during the war. Other features included two new wet basins, 12 building slips, buildings for X-ray and gamma ray inspection of welds and castings as well as portable X-ray machines.

One of the interesting sidelights to Quincy's wartime history is that the yard may have been the origin for the famous "Kilroy was here" phenomenon. In a search conducted by the American Transit Association in 1946, the conclusion was drawn that a Quincy-Fore River welding inspector named James J. Kilroy verified the riveters' piece work by writing "Kilroy was here" on his inspected areas to prevent fraud on the part of the riveters. He apparently scrawled the now famous phrase on dozens of troopships, naval and landing craft, and from that origin, the custom spread wherever the American armed forces campaigned (Sarcone and Rines, p. 26).

The Post-War Period

During the post-war period, Quincy could no longer rely on the plentiful and profitable government wartime contracts, and had to look toward new ways of shipbuilding in order to survive. In those years, inflation, high material costs, high wages and strong union pressures threatened the shipbuilding industry as a whole.

One of the main problems for the industry was a repercussion of the Ship Sales Act of 1946, under which the government sold surplus merchant vessels at extremely low prices, leaving shipyards with no new construction orders. While this created a strong U.S. merchant Marine, it also created one that would need few new vessels until the 1960s.

At the end of the immediate post-war slump, in the early 1950s, several sleek "new American" merchant ships were designed and built by the yard for American Export Lines. These ships, the *Independence* and *Constitution* were the most advanced ships of their day. Other cargo ships such as C-4 cargo vessels were delivered in 1951-2. It was at this time that tankers became the prime item for the yard. Several were produced for Gulf Oil, and one for the Navy. One highly unusual job was the construction of the chemical tanker the *Marine Dow-Chem*. This 554 foot, 16,200 ton vessel was constructed of nickel steel and could safely carry many different types of chemicals.

Political developments played a role in the shipyard's lack of business as well. Contracts for eight *Forrestal* class carriers all went to the Newport News Shipyard in Virginia, with none going to Quincy. During this period Quincy did win contracts for three frigates worth about \$52 million, and a few other Navy contracts, but they were few, given the size of the post-war Navy.

In an attempt to become more competitive, Bethlehem decided in 1957 to renovate the building areas at Fore River in a \$14 million expansion program. The chief features of this expansion program were a 950' x 450' building basin that replaced six of the old pre-World War I sliding ways. Depending on the vessels' size, the basin could accommodate three to six ships. In the later 1950s to 1963, there was also substantial renovation of the buildings.

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 14)

15

Toward the end of the 1950s, more tanker contracts began to come in, and Fore River set several records for constructing the largest tankers of their day. The sister ships *World Glory* and *World Beauty* were 736' long, and could carry 16.5 million gallons of crude oil. In 1959 the yard built the *Princess Sophie*, a giant tanker over 850' long. In all, the yard produced 14 tankers in the decade of 1950-60, with total ship contracts valued at more than \$200 million.

During the early 1960s Quincy led the way in the area of nuclear surface ship engineering. In a six year, \$100 million project, Quincy developed and built the nuclear propelled guided missile cruiser *Long Beach*. The *Long Beach* was the first nuclear powered surface vessel in the United States Navy, and a major engineering accomplishment. The entire vessel was designed by the Central Technical Department at the shipyard. She was quickly followed by the frigate *Bainbridge*, another nuclear powered, Quincy-built vessel (Sarcone and Rines, p. 28).

By 1963 the facility had produced several nuclear vessels, including nuclear attack submarines, guided missile cruisers, and nuclear frigates. In 1962 the yard also produced the tanker *Manhattan*, at the time of her completion the largest commercial vessel ever built (General Dynamics, p. 7). The new decade had not started well for shipyard management, however. A five month strike that began in January of 1960 brought all work to a grinding halt. The issues were never clearly addressed or dealt with, and while the strike was not the worst in the shipyard's history, it came at a very inopportune time. Work was set back a year, and new contracts were sluggish to come in. In addition to the strike, the yard was accused of overcharging about \$5 million in the construction of the frigate *Bainbridge*.

Increased costs, a lowered confidence in the yard, and the fact that the U.S. Merchant Marine had begun a long decline into virtual nonexistence, forced Bethlehem to sell the yard in 1963. In its 60 years of ownership, Bethlehem had saved the yard from financial ruin in 1913; guided it through two world wars, massive growth and profit; and had made Fore River one of the foremost shipbuilding establishments in the world.

Quincy Shipbuilding Division

In 1963 the Shipyard was put up for sale, and in 1964 it was purchased by the General Dynamics Corporation, one of the largest defense contractors in the United States. General Dynamics bought the shipyard property, but did not buy the business itself.

At the time of the purchase, General Dynamics owned a total of 136 acres of the Shipyard, and the United States Government owned 39 acres of land near the site's southern boundary. Although the exact procedure is unclear, General Dynamics obtained the 39 acres and began to expand new facilities into the area. General Dynamics established the Quincy Shipbuilding Division in 1964, and began plant improvement projects totalling \$23 million. \$1.3 million was spent on improving and updating the yard's cranes, \$2.5 million on new shot blast and paint facilities, and \$3 million on the yard and buildings. The rest of the investment went towards the purchase of numerically controlled burning machines, new shape handling ammunition ships, submarine tenders, supply ships, fleet replenishment oilers, deck landing ships, and Sea Bee barge transport ships. The

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 15)

16

yard also produced three converted ships for the Apollo space program, known as Apollo instrument ships or "big ears," the *Vanguard*, *Redstone* and *Mercury*. In the energy field the yard also built and delivered the S.S. *Energy Independence* in 1983, the first coal carrying, coal fired ship built in the U.S. since the 1920s (Sarcone and Rines, p. 32).

Toward the end of the shipyard's career as a General Dynamics yard, contracts were not coming in at a sufficient rate to keep the yard employed. To help stave off impending layoffs there were many naval repair jobs taken up, but on the whole the future for the yard looked grim. Despite the LNG contracts, Quincy shipyard could not obtain a degree of consistency in building ships of one type of class. The tradition of diverse construction had never allowed Quincy-Fore River shipyard to specialize in one type of vessel. Such specialization would have allowed the development of labor-saving methods and would have improved Quincy's competitive position against other shipyards. Thomas Watson had tried, unsuccessfully, to attain this goal as early as 1900, and it remained a problem throughout the yard's history.

The last ship produced at Fore River, the *Sgt. William R. Button*, was delivered May 22, 1986, and the process of deactivation began that same year.

SOURCES OF INFORMATION

In the course of this documentation, archival materials of the following repositories possessing major collections of shipyard materials were reviewed. Due to the vast quantities of materials, not all items in the collections were viewed. However, important plans and historic views were identified for the documented resource. In addition to these collections, additional materials may exist in the corporate archives of the Bethlehem Steel Company and the General Dynamics Corporation.

Bethlehem Steel Collection, Hart Nautical Collections, The MIT Museum, Cambridge, Massachusetts. Working drawings, photographs, and project files (1851-1940). The bulk of this collection consists of approximately 60,000 negatives. In addition, there are 3 "Real Estate Data Pertaining to Buildings" notebooks containing mounted photographs (ca. 1944) and approximately 20 notebooks containing mounted views of the shipyard (1902-ca. 1922).

General Dynamics Corporation Collection, Hart Nautical Collections, The MIT Museum, Cambridge, Massachusetts. Photographic negatives (1964-1984).

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 16)

17

Quincy-Fore River Shipyard Collection, Quincy Historical Society, Quincy, Massachusetts. A variety of materials including artifacts, photographs, information on ships constructed and a copy set of Yard Plans (1943, H. V. Bisbee) (ca. 1900-1984).

Quincy-Fore River Shipyard Files (Massachusetts Water Resources Authority), Quincy, Massachusetts. Located in the Administration Building. Working drawings (ca. 1900-1984) and project files (ca. 1940-1984).

GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 17)

18

Bibliography

Bethlehem Steel Company

The Properties and Plans of Bethlehem Steel Corporation. 1925.

Bethlehem Steel Company

Shipbuilding Division, Fore River Yard, Yard Plans. 1943.

Boston Affiliates, Inc.

Quincy-Fore River Shipyard Historic Resources Survey and Addendum. Prepared for the Massachusetts Water Resources Authority, Boston, MA, October 20, 1988 and January 2, 1989.

Branch, Ernest W.

Atlas of the City of Quincy, Norfolk County, Massachusetts. Boston, Quincy: Ernest W. Branch, 1907.

Branch, Ernest W.

Atlas of the City of Quincy, Massachusetts. Quincy: Ernest W. Branch, 1923.

General Dynamics Corporation

A Century of Pride, 1884-1984. Quincy: General Dynamics Corporation, 1984.

Leggat McCall Advisors, Inc.

Appraisal Report: General Dynamics Shipyard Quincy/Braintree, Massachusetts. 1987.

Lincoln, Helen M.

"Recollections of Quincy Point and Shipbuilding," unpublished, 1961.

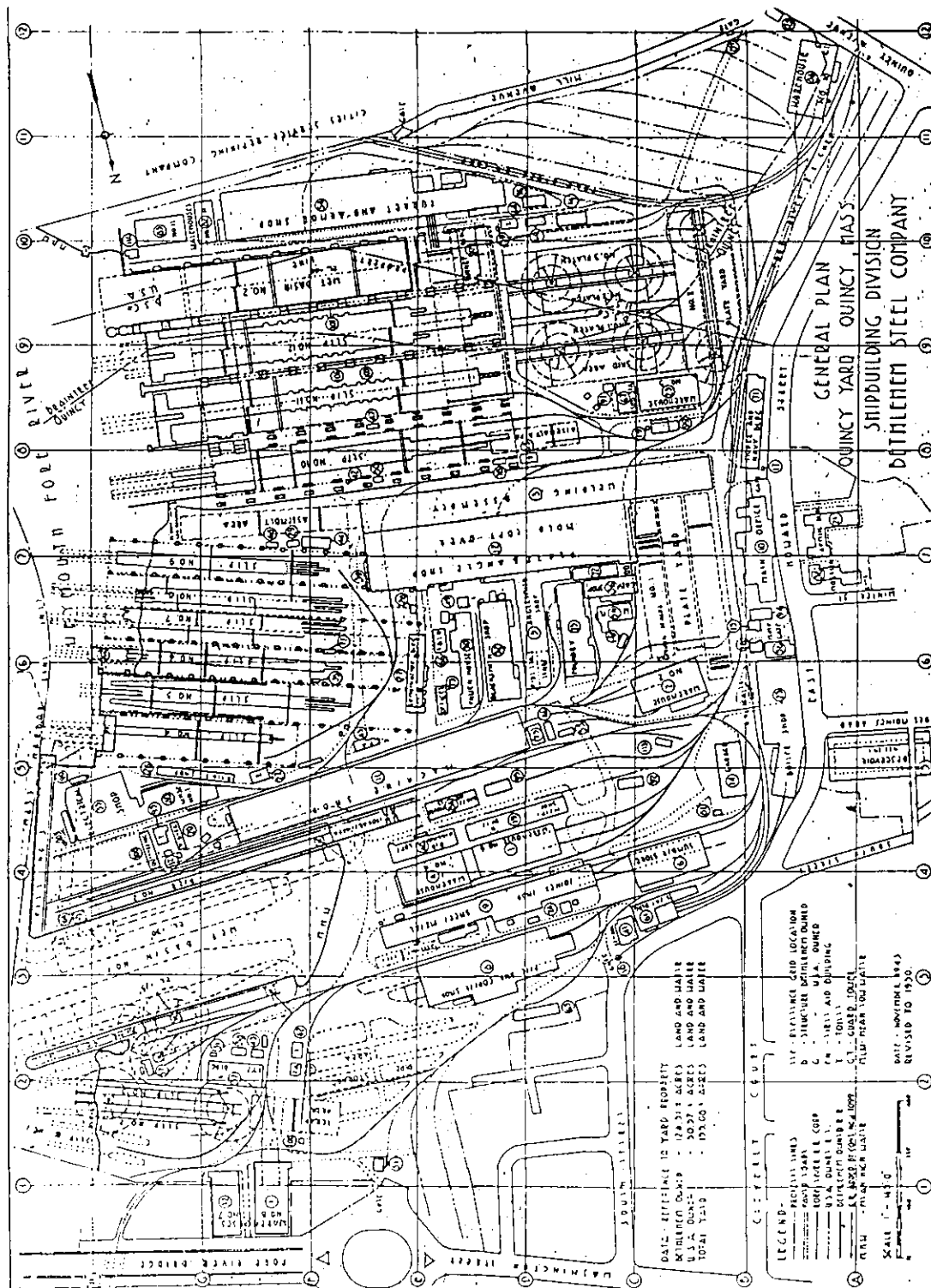
Quincy School Department

Quincy Historical Booklets, Book IV: Industries of Quincy. 1943.

Sarcone, Anthony F. and Rines, Lawrence S.

A History of Shipbuilding on the Fore River, 1975.

Location Map



GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 19)

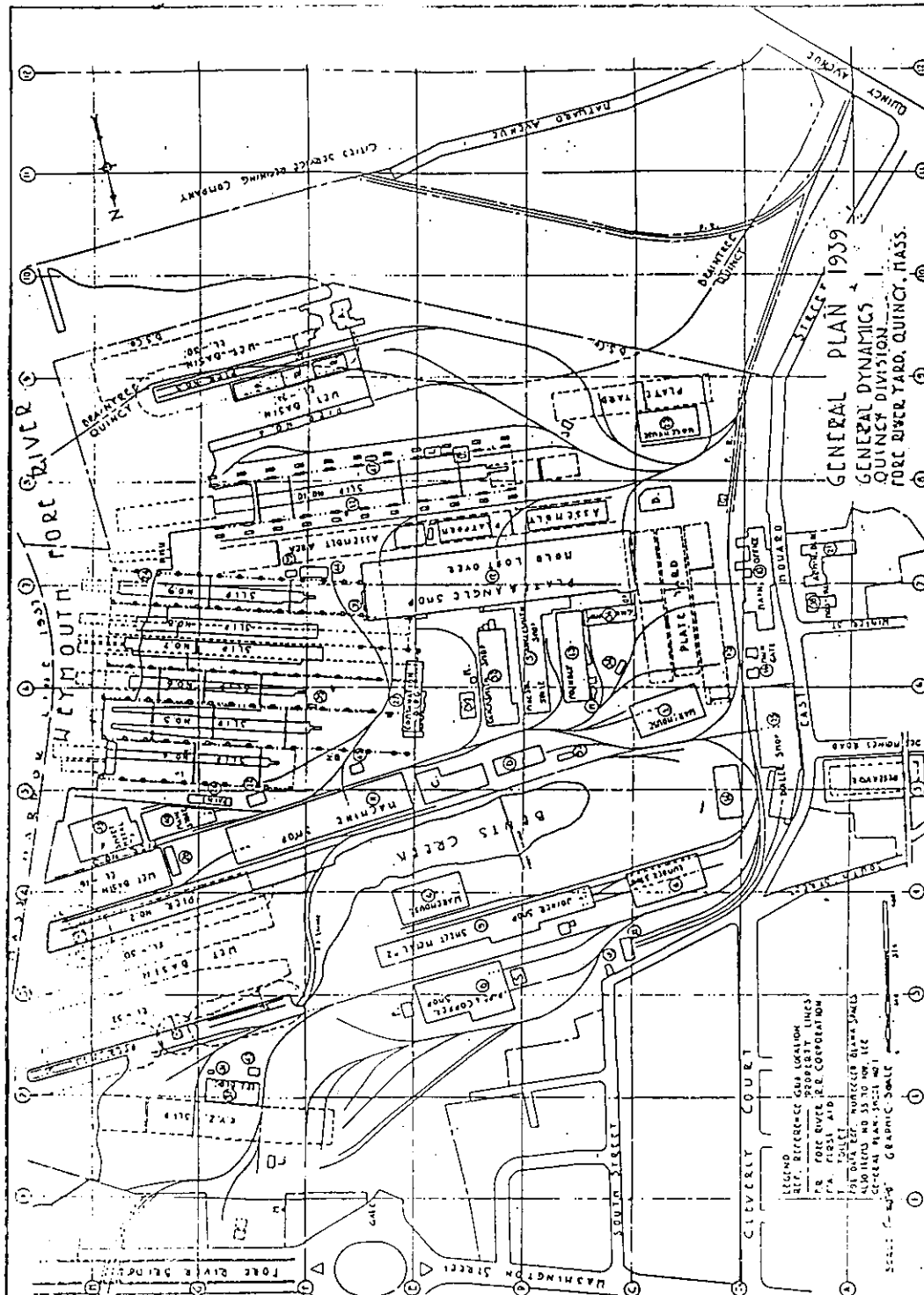
20

LIST OF YARD STRUCTURES

NO	DESCRIPTION	OWNER	DATE	REMARKS	NO	DESCRIPTION	OWNER	DATE	REMARKS
1	WAREHOUSE NO. 6	G	1941	D-4	71	MODEL & NAVY BLDG	G	1941	A-2
2	NO. 7	G	1941	C-6	72	MOLD STORAGE	D	1941	C-7
3	WELDING ASSEMBLY	G	1941	D-8	73	AJ, AD, AL & AC DEPTS BLDG	G	1941	C-6
4	WAREHOUSE NO. 4	G	1940	C-4	74	MISC. SERVICE BLDG	G	1942	D-10
5	ANGLESMITH SHOP & MFG. SHED	G	1941	D-6	75	ANNEALING FURNACE BLDG	G	1943	D-5
6	LUMBER STORE	D	1916	C-4	76				
7	WAREHOUSE NO. 8	G	1941	F-1	77	WELDING SUB-STATION	G	1942	F-6
8	PIPE & COPPER SHOP	D	1917	D-3	78	"	D	1942	D-8
9	JOINER & SHEET METAL SHOP	G	1916	D-4	79	OXYGEN CONTROL	D	1942	C-8
10	MAIN OFFICE BLDG	D	1917	D-7	80				
11	MACHINE SHOP	G	1901	E-5	81	TRANSPORTATION OFFICE	D	1942	D-5
12	PLATE & ANGLE SHOP	G	1916	D-7	82	WAREHOUSE NO. 11	G	1942	C-10
13	DRESS FOUNDRY	D	1903	D-6	83	" NO. 12	G	1942	C-10
14	YARD GARAGE	D	1936	D-5	84	" NO. 13	G	1942	C-4
15	MAIN GATE HOUSE	D	1917	D-6	85	PAPER RECLAIMING PLANT	D	1942	D-17
16	"	D	1917	D-6	86	WAREHOUSE NO. 10	G	1943	A-11
17	MOLARO AVE GATE HOUSE	G	1941	D-8	87				
18	SOUTH STREET	G	1943	C-2	88				
19	MODEL SHOP & Q DEPT.	G	1941	D-4	89	HILL AVE GATE HOUSE	G	1942	D-12
20	YARD DEPARTMENT BLDG	D	1917	C-4	90	WELDING SUB-STATION	G	1942	D-5
21	ADMINISTRATION BLDG	D	1930	A-7	91	BATTERY STORAGE BLDG	D	1942	C-9
22	TOILET & OFFICE	D	1903	F-5	92	N DEPT. BLDG	D	1942	C-5
23	WAREHOUSE NO. 3	D	1917	C-9	93	YARD TOILET	G	1943	C-4
24	INCINERATOR BLDG	D	1929	D-4	94	TEMPORARY OFFICE BLDG	G	1943	D-6
25	BOILER SHOP	G	1910	D-5	95	N DEPT. MOLD LOFT	G	1943	D-5
26	PAINT	G	1916	C-5	96	WELDING SCHOOL	G	1943	D-10
27	COMBINATION BLDG	D	1920	C-6	97				
28	MATERIALS OFFICE	D	1941	C-7	98				
29	COMPRESSOR STATION	D	1918	F-7	99	ACETYLENE STORAGE BLDG	D	1942	C-8
30	POWER PLANT NO. 1	D	1917	C-6	100	OIL RECLAIMING PLANT	D	1943	F-2
31	TRANSFORMER STATION	D	1936	G-2	101				
32	BLACKSMITH SHOP	D	1905	D-6	102	PUMP HOUSE	D	1919	D-6
33	ELECTRICAL SHOP	G	1905	M-5	103	"	G	1942	M-4
34	TEST HOUSE	D	1906	C-6	104	WELDING SUB-STATION	D	1941	M-4
35	WELDING SUB-STATION	D	1939	F-6	105	WAY FOREMAN'S OFFICE	G	1942	F-9
36	GALVANIZING SHOP	G	1919	C-7	106	WELDING SUB-STATION	G	1941	F-9
37	XYZ BUILDING	D	1918	C-2	107	"	G	1941	F-9
38	MAIN HOSPITAL BLDG	D	1946	A-7	108	OUTFITTING BLDG	G	1943	C-9
39	SWITCHING STATION	D	1939	E-7	109	TURRET BLDG - AUX.	D	1943	D-10
40	WAREHOUSE NO. 1	D	1915	C-5	110				
41	APPRENTICE SCHOOL	G	1917	C-5	111				
42	SWITCHING STATION	G	1939	F-8	112	METAL SPRAY BLDG.	D	1943	G-4
43	COMPRESSOR	D	1940	F-2	113	LDCO. CRANE REPAIR BLDG.	D	1944	C-5
44	BOLT RECLAIMING PLANT	D	1950	F-7	114	TEST BLDG	G	1950	M-10
45	YARD HOSPITAL	G	1943	E-5					
46	PIPE MAINTENANCE SHOP	G	1942	D-5					
47	WELDING SUB-STATION	D	1936	E-8					
48	OLD RIGGING LOFT	G	1941	E-4					
49	AUX. POWER HOUSE	D	1943	D-7					
50	WAY FOREMAN'S OFFICE	G	1941	E-8					
51	ALUMINUM SCRAP SHED	G	1941	E-1					
52	WAREHOUSE NO. 7	G	1941	C-1					
53	OIL STORAGE PIT	D	1922	D-5					
54	TURRET & ARMOR SHOP	G	1942	F-10					
55	PUMP HOUSE	G	1942	D-10					
56	MISC. OFFICE BUILDING	G	1942	D-6					
57	WELDING SUB-STATION	G	1941	C-2					
58	WAY FOREMAN'S OFFICE	G	1941	C-2					
59	WAREHOUSE NO. 9	G	1941	C-6					
60	TEMPLATE STORAGE	D	1942	D-10					
61	X-RAY BLDG	G	1941	C-3					
62	TOILET & LOCKER BLDG	G	1941	F-2					
63	"	G	1941	D-8					
64	"	G	1942	D-10					
65	PIPE STORAGE BLDG	G	1942	D-5					
66	S, ED & O DEPARTMENTS BLDG	G	1941	E-6					
67	SUB-STATION NO. 2	G	1941	C-8					
68	WELDING SUB-STATION	D	1941	F-7					
69	FIRST AID BLDG	G	1943	F-2					
70									

NOTE - GRADES OF ALL BUILDING MOORS AND OF ALL SHELTERS - CITY OF QUINCY BASE.
ALL OTHER GRADES - U.S. ARMY ENGINEERS BASE.

24



Addendum

22

NO	DESCRIPTION	FINISHED DATE	REF.	NO	DESCRIPTION	FINISHED DATE	REF.
1	WAREHOUSE NO.2	1901	C-6	A	HEAD HOUSE	1919	F-10
2				B	WAREHOUSE NO.3	1913	C-6
3				C	POWER HOUSE NO.1	1901	C-3
4	WAREHOUSE NO.4	1930	C-4	D	SMITH BRIGHT BLDG.	1912	D-5
5	ANGLESMITH SHOP, FINE	1901	D-6	E	TRANSFORMER STA.	1933	G-4
6	LUMBER STORE	1916	C-4	F	PIPE WELDING SHOP	1939	E-3
7				G	NOWARD AVE. GATE HOUSE	1918	D-8
8	PIPE & COPPER SHOP	1917	D-3	H	PIPE REPAIR SHOP	1909	C-6
9	JOINER & NOZ SHEET METAL	1916	D-4	I	SUB. STORE BLDG.	1918	E-8
10	MAIN OFFICE BLDG.	1911	D-7	J	GREASE HOUSE	1910	D-9
11	MACHINE SHOP	1901	E-5	K	STORAGE SMITH SHOP	1918	D-6
12	PLATE & ANGLE SHOP	1916	D-7	L	RECLAIMING SHED	1909	F-1
13	BRASS FOUNDRY	1903	D-6	M	WASHINGTON ST. GATE NO.	1918	F-1
14	YARD GARAGE	1936	D-5	N	GAS PUMP HOUSE	1938	F-3
15	MAIN GATE HOUSE	1917	D-6	O	ANNEALING BUILDING	1939	E-8
16		1917	D-6	P	TURRET ASSEMBLY BLDG.	1939	F-9
17				Q	TURRET MACHINE SHOP	1939	F-9
18	SOUTH ST.	1919	C-3	R	TURRET SUB-ASSEMBLY	1939	F-9
19				S	PIPE STORAGE BLDG.	1934	D-3
20	Q DEPT. BLDG.	1923	G-4	T	TOILET SLIP NO.10.	1936	E-8
21	ADMINISTRATION BLDG.	1930	A-7				
22	YARD TOILET	1910	F-3				
23	WAREHOUSE NO.5	1919	C-9				
24	PUMP HOUSE	1919	G-7				
25	BOILER SHOP	1910	D-5				
26	PAINT	1916	G-5				
27	COMBINATION BLDG.	1920	E-6				
28							
29	COMPRESSOR STATION	1918	F-7				
30	SUB-STA.	1917	F-6				
31	TRANSFORMER STA.	1938	G-2				
32	BLACKSMITH SHOP	1905	D-6				
33	SHEET METAL	1905	H-5				
34	FESE HOUSE	1906	C-6				
35	WELDING SUB STATION	1939	F-6				
36	GALVANIZING SHOP	1919	G-7				
37	X.Y.Z. BUILDING	1918	G-2				
38	MAIN HOSPITAL BUILDING	1916	A-7				
39	SUTCHING STATION	1939	E-7				
40	MAIN STORE	1915	G-5				
41	APPRENTICE SCHOOL	1917	C-3				
42	SUTCHING STATION	1939	F-8				
43	COMPRESSOR	1918	F-2				
44	BOLT RECLAIMING PLANT	1930	F-7				
45	YARD HOSPITAL	1918	E-5				
46							
47	WELDING SUB STATION	1936	E-8				
48							
49							
50							
51							
52							
53	DIS STORAGE MT	1922	D-5				
54							

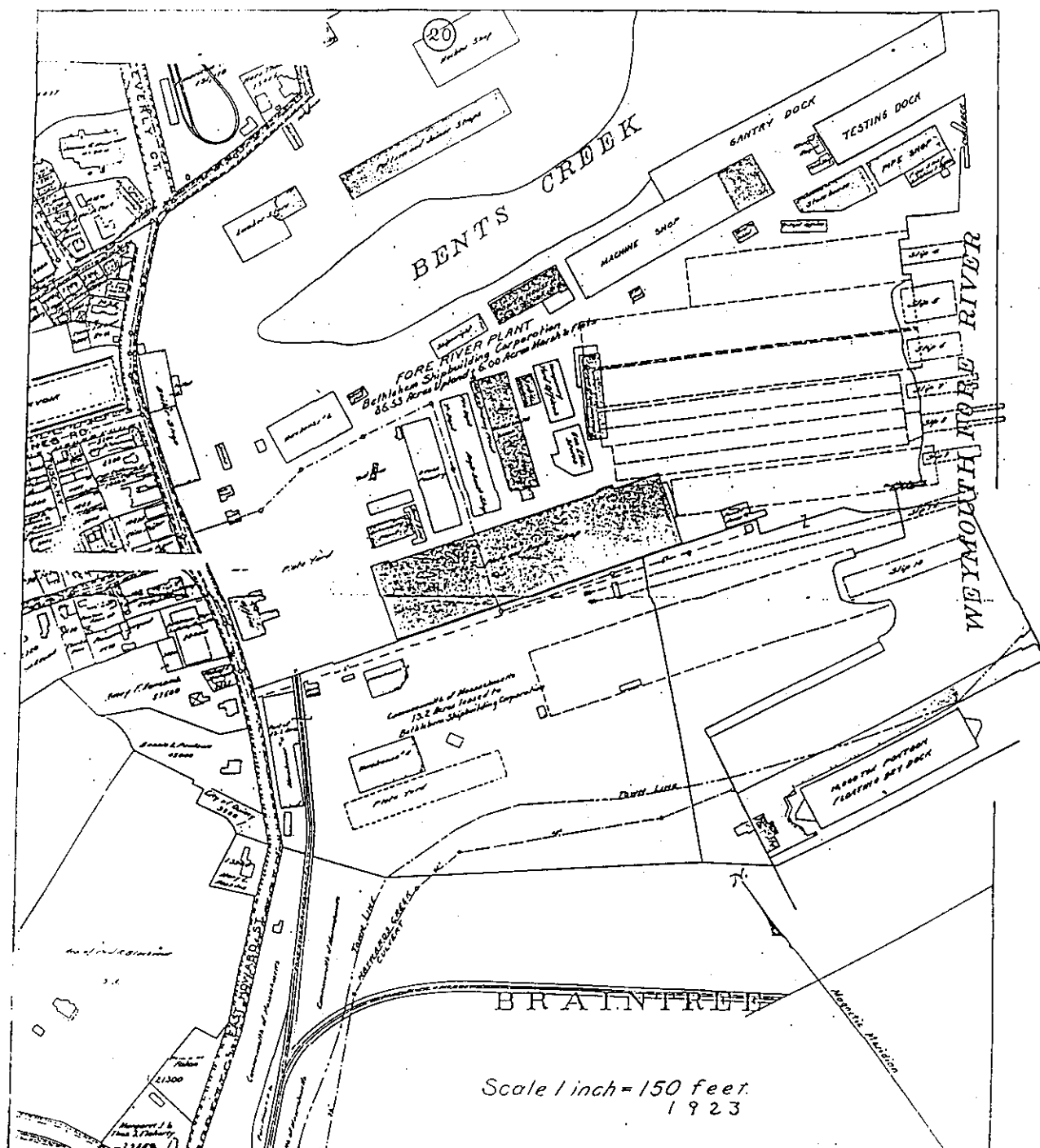


GENERAL DYNAMICS CORPORATION SHIPYARD

Addendum

HAER No. MA-26 (Page 22)

23



Addendum

24

